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THE IMPACT OF FOREIGN DIRECT INVESTMENTS ON ECONOMIC GROWTH IN HANOI

The paper attempts to provide the answers to the following two key questions: How does FDI affect real gross domestic product per capita in the case of Hanoi, the capital of Vietnam? and What are the policy implications to leverage the positive impact of FDI in the long run? The results of 25-years data analysis (1990 to 2015) show that foreign investments have no obvious impact on the dependent variable in the short run. While in the long run, its impact is found to be much smaller than that of public investments. Moreover, there exists a bilateral nexus between foreign and public investments in the case under study. The paper provides policy recommendations developed by the authors.

Keywords: Vietnam; Hanoi; FDI; gross domestic product; public investments.

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ВПЛИВ ПРЯМОГО ІНОЗЕМНОГО ІНВЕСТУВАННЯ НА ЕКОНОМІЧНЕ ЗРОСТАННЯ ХАНОЮ

У статті зроблено спробу відповісти на два ключових питання: яким чином ПІІ впливають на реальний валовий внутрішній продукт на прикладі Ханою, столиці В'єтнаму? а також яким чином необхідно змінити політику для посилення цього позитивного впливу у довготерміновій перспективі? Результати аналізу даних за 25-річний період (з 1990 по 2015 рр.) вказують на те, що іноземне інвестування не має очевидного впливу на ВВП у короткотерміновому періоді. У той час як у довготерміновому періоді вплив іноземних інвестицій значно слабший, ніж державного інвестування. Крім того, встановлено існування двосторонньої взаємозалежності між іноземними приватними та внутрішніми державними потоками інвестицій. За результатами аналізу також надано рекомендації щодо змін державної політики в цій сфері.

Ключові слова: В'єтнам; Ханой; ПІІ; валовий внутрішній продукт; державне інвестування.

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ВЛИЯНИЕ ПРЯМОГО ИНОСТРАННОГО ИНВЕСТИРОВАНИЯ НА ЭКОНОМИЧЕСКИЙ РОСТ ХАНОЯ

В статье авторы сделали попытку ответить на два ключевых вопроса: каким образом ПИИ влияют на реальный валовой внутренний продукт на примере Ханоя, столицы Вьетнама? а также каким образом необходимо изменить политику для усиления данного позитивного влияния в долгосрочной перспективе? Результаты анализа данных за 25-летний период (с 1990 по 2015 гг.) указывают на то, что иностранное инвестирование не имеет очевидного влияния на ВВП в краткосрочном периоде. В то время как в долгосрочном периоде влияние иностранных инвестиций значительно слабее, чем государственных инвестиций. Кроме того, установлено существование двусторонней взаимозависимости между иностранными частными и внутренними государственными потоками инвестиций. По результатам анализа также представлены рекомендации по изменению государственной политики в данной сфере.

Ключевые слова: Вьетнам; Ханой; ПИИ; валовой внутренний продукт; государственное инвестирование.

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Problem statement. Vietnam is a developing economy in Southeast Asia. Economic and political reforms, implemented since 1986, have spurred rapid economic growth and transformed Vietnam from one of the world's poorest to a lower middle-income country. Hanoi, Vietnam's capital, is one of the very important drivers contributing to the impressive growth rate. In 1990, there were only 12.5 mln USD implemented as FDI coming to Hanoi but that figure was already 1,091 mln USD in 2015. By the end of 2015, there were 68 countries and territories investing in Hanoi with total disbursed capital of approximately 20 bln USD. This source of capital helped increase $\overline{Y}$ from more than 1,000 USD to 2,324 USD during the period of 1990−2015. This fact raises some questions related to how FDI affects $\overline{Y}$ in Hanoi? And what needs to be done to further leverage FDI in the coming years? This paper attempts to answer these questions.

Literature review. There are many studies on the relationship between FDI and economic growth rate. Some of the major papers are reviewed hereafter. Neoclassical economists develop models indicating the nexus between FDI and economic growth. Assuming that technical progress and labor force are exogenous variables and FDI affects positively on technology, R.M. Solow (1956) argues that it also positively contributes to economic growth. J. De Gregorio (1992), in his study on 12 Latin American countries (1950−1985), discovers that FDI indeed has a positive impact on economic growth. This positive contribution is also found on a larger scale by M. Blomstrom et al. (1994) who conducted their study on 78 developing and 23 developed countries over the period of 1960−1985. Later, in a research spanning from 1970 to 1989 in 69 developing countries, E. Borenzsteinet et al. (1998) discovered that FDI not only has positive influence on economic growth but also contribute strongly to the development of human capital in a host country. The consistently positive role of FDI for economic growth is also confirmed in the study by N.F. Campos and Y. Kinoshita (2002) examining 25 Central and Eastern European and former Soviet Union transition economies. Moreover, A. Chowdhury and G. Marvrotas (2003) study the causal interplay between FDI and growth in the cases of Chile, Malaysia and Thailand during the period of 1969−2000. They discover that gross domestic product (GDP) leads to FDI for Chile while there is a bi-directional causality between them in Malaysia and Thailand. The paper of M. Khawar (2005) confirms FDI's positive impacts on economic growth in an empirical cross-country study for the period of 1970−1992. S. Yao (2006) arrives at the same conclusion in the case of China (1978−2000). R. Bhandari et al. (2007) show similar results in the case of again East European countries. Most recently in 2014, Omri and Kahouli demonstrate that FDI positively affects economic growth in the Middle East and North Africa.

Regarding FDI, upon analyzing Vietnam's FDI statistics from 1988 to 2003, P. Mai (2003) finds that FDI has a positive effect on growth of economy as a whole. N. Huong and B. Nhuong (2003) compare and analyze the movements of FDI inflows to Vietnam and China in the period 1979−2002 and draw some lessons for Vietnam. They verify the important role of FDI on Vietnam's development in terms of economic growth, structural change and job creation. D. Phuc (2004) asserts that Vietnam's economic growth is largely dependent on foreign invested capital in the

period of 1988–2003. Then, N. Hoa (2004) concludes that FDI positively impacts on economic growth through formation and accumulation of capital assets. In addition, there is evidence to support the relationship between FDI and human resource. D. Phuc (2004) argues that Vietnam's growth rate is largely dependent on foreign invested sector and demonstrates considerable contribution of FDI to value added of industry sector, capital formulation, job creation and balance of payments. N. Anh et al. (2006) indicates how FDI influences capital formation and growth rate in Vietnam's economy. N. Lan (2006) confirms the positive role of FDI not only on economic growth but also on domestic investment. S. Anwar and N. Lan (2011) reaffirm the positive effect of FDI on Vietnam's economic growth over the period of 1996–2005.

Contrary to this range of research at the national level, there are few studies on the role of FDI in Hanoi and the majority of them are qualitative. B. Quang and N. Hans (2002) studied the impacts of national policy framework changes on investment environment. V. Tuan (2006) studies the effects of the institutional factor on attracting FDI in Hanoi in the period of 2001–2010. B. Quang and N. Hung (2006) qualitatively evaluate the impacts of FDI on the economy in terms of export turnover, job creations and industrial production. Based on this research, N. Mai and V. Son (2011) concentrate on the determinants that attract more FDI inflows into Hanoi. Most recently, V. Anh (2015) also analyzes the role of FDI in the process of economic development in Hanoi.

Research objective. This research attempts to quantify the impact of FDI on $\overline{Y}$ in Hanoi in both short and long run in the context of comparison with public investment, the leading source of investment capital in Hanoi development strategy. On the basis of the research results, the paper suggests some policy implications to further leverage of the positive impact of FDI in Hanoi in the coming years.

Methodology. Data of this research is time-series derived from various sources. Annual data of labour force and population is reported by the General Statistical Office of Vietnam (www.gso.gov.vn); data on public investment, from 1990 to 2005, was compiled from the book titled "Figures of socioeconomic achievements of the capital during 60 years of building and development", issued by Hanoi Statistical Publishing House and Hanoi Department of Planning and Investment (www.hapi.gov.vn), 2006 to 2015; FDI disbursement and real GDP are collected from Hanoi Statistical Office (www.thongkehanoi.gov.vn). Descriptive statistics of the variables are reported in Table 1.

The paper employs ARDL to run the model, a method widely considered the most successful and flexible for measuring the impact of one independent variable on a dependent one using time-series data. ARDL is selected because of the following advantages: it requires a much smaller sample size as compared to co-integration by others methods; ARDL procedure allows variables to have different optimal lag while it is impossible with conventional co-integration procedures; ARDL procedure employs only a single reduced form equation while the conventional co-integration procedures estimate the long-run relationships within a context of the system of equations; ARDL assesses the impact of one variable on another in the short run and long run simultaneously.

Table 1. **Descriptive statistics of the variables,** *authors'*

	Mean	Medium	Maximum	Minimum	Standard Deviation
$L\overline{Y}$	7.450774	7.398427	7.751073	7.241102	0.147471
LLF	14.32022	13.95913	15.22536	13.87105	0.547154
LPI	9.648931	9.564126	11.30382	7.972811	1.086925
LFDI	12.58894	12.92305	13.90261	9.440023	1.205453

In this model, the dependent variable, real GDP per capita $(\overline{Y})$, another indicator of economic growth, is a function of other independents variables: labour force (LF), public investment (PI) and foreign direct investment (FDI):

$$\overline{Y} = f(LF, PI, FDI). \tag{1}$$

Taking natural logs of both sides (with the error term u_t), the following equation can be written:

$$L\overline{Y} = c_0 + \alpha_1 LLF + \alpha_2 LPI + \alpha_3 LFDI + u_t. \tag{2}$$

It is expected that all parameters $(\alpha_1, \alpha_2, \alpha_3) > 0$, where $L\overline{Y}$ is the natural logarithm of real GDP per capita (unit: USD); LLF is the natural logarithm of labour force (unit: person); LPI is the natural logarithm of public investment (unit: billion domestic currency at 2005 fixed price); $LFDI$ is the natural logarithm of implemented FDI (unit: USD); c_0 is the intercept and u_t is the error term.

The paper employs the augmented Dickey-Fuller (ADF) test to verify the stationarity of the 4 time series variables. The ADF tests applied in the paper are of constant and no trend model as the following equation:

$$\Delta y_t = \alpha_0 + \gamma y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-i} + \varepsilon_t, \tag{3}$$

where $\Delta y_t = y_t - y_{t-1}$ is the first difference of the series y_t; $\Delta y_{t-1} = y_{t-1} - y_{t-2}$ is the first difference of y_{t-1} etc.; α_0, γ and β_i are the parameters to be estimated; ε_t is a stochastic disturbance term. The number of lagged terms is chosen to ensure that errors are uncorrelated.

In this model, the first step of ARDL bounds testing approach is to estimate the following equation:

$$\Delta L\overline{Y}_t = c_0 + \delta_1 L\overline{Y}_{t-1} + \delta_2 LLF_{t-1} + \delta_3 LPI_{t-1} + \delta_4 LFDI_{t-1} + \sum_{i=1}^{p} \phi_i \Delta L\overline{Y}_{t-i} + $$
$$+ \sum_{j=1}^{q} \varpi_j \Delta LLF_{t-j} + \sum_{l=1}^{q} \varphi_l \Delta LPI_{t-l} + \sum_{m=1}^{q} \gamma_m \Delta LFDI_{t-m} + \varepsilon_t. \tag{4}$$

The above equation is estimated by ordinary least square (OLS) to test for the existence of a long run relationship among the variables by conducting F-test for the joint significance of the coefficients of the lagged levels of the variables, i.e., null hypothesis (H_N): $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ against the alternative (H_A): $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$. The paper denotes the test which normalizes on $\overline{Y}$ by $F_{\overline{Y}}$ $(L\overline{Y} | LLF, LPI, LFDI)$. Two asymptotic critical values bounds provide a test for co-integration when the inde-

pendent variables are I(d) (where $0 \leq d \leq 1$): a lower value assuming the regressors are I(0), and an upper value assuming purely I(1) regressors. If the F-statistic is above the upper critical value, the null hypothesis of no long run relationship can be rejected irrespective of the orders of integration for the time series. Conversely, if F-statistics falls below the lower critical value — the null hypothesis cannot be rejected. And finally, if F-statistics is between lower and upper critical values, the result is inconclusive.

In the second step, once co-integration is established the conditional ARDL (p,q_1,q_2,q_3) long-run model for $\overline{LY}_t$ can be estimated as:

$$\overline{LY}_t = c_0 + \sum_{i=1}^{p} \delta_1 \overline{LY}_{t-i} + \sum_{i=0}^{q_1} \delta_2 LLF_{t-i} + \sum_{i=0}^{q_2} \delta_3 LPI_{t-i} + \sum_{i=0}^{q_3} \delta_4 LFDI_{t-i} + \varepsilon_t, \qquad (5)$$

where all variables are defined previously. This involves selecting the orders of ARDL (p,q_1,q_2,q_3) model in the 4 variables using Akaike information criteria (AIC).

In the third step, the paper obtains the short-run dynamic parameters by ARDL estimation on the following equation:

$$\Delta \overline{LY}_t = \mu + \sum_{i=1}^{p} \phi_i \Delta \overline{LY}_{t-i} + \sum_{j=1}^{q} \varpi_j \Delta LLF_{t-j} + \sum_{l=1}^{q} \varphi_l \Delta LPI_{t-l} +$$
$$+ \sum_{m=1}^{q} \gamma_m \Delta LFDI_{t-m} + \vartheta ecm_{t-1} + \varepsilon_t, \qquad (6)$$

in which, ϕ, ϖ, φ, γ are the short-run dynamic coefficients of the model's convergence to equilibrium, and ϑ is the speed of adjustment.

This paper will be implemented through the following steps. Firstly, it tests the stationarity of all 4 time series variables; secondly co-integration is tested by bounding tests; thirdly, the model diagnostics is tested; fourthly, regression is run by ARDL and in the last step, variance decomposition is analyzed.

Key research findings. It is necessary to test the stationarity of all variables to determine their order of integration. This is to ensure that the variables are not I(2) stationary so as to avoid spurious results. According to B. Ouattara (2005) in the presence of I(2) variables the computed F-statistics provided by M.H. Pesaran et al. (2001) is not valid because the bounds test is based on the assumption that the variables are I(0) or I(1). This conclusion was repeated in (Box et al., 2014). The paper applies "Eview 9" software for the analysis, employing the augmented Dickey-Fuller (ADF) test to verify the stationarity of the 4 time series $\overline{LY}$, *LLF, LPI* and *LFDI*. The results of ADF test are reported in Table 2. As demonstrated, all 4 variables are non-stationary in the level form. Therefore, the paper investigates the stationarity of the first difference of all the variables. The results indicate that the 4 time series are all integrated of order one, I(1).

In the next step of ARDL analysis, we test for the presence of long-run relationships among the variables in the model. The F-statistics tests the joint null hypothesis that the coefficients of the lagged level variables are zero (i.e., no long run relationship exists between them). Table 3 reports the results of the calculated F-statistics when each variable is considered as a dependent one in ARDL regressions. The calculated F-statistics $F_{\overline{Y}}$ (*LY*|*LLF,LPI,LFDI*) = 10.0707 is higher than the upper

bound critical value of 5.61 at the 1% level. Thus, the null hypothesis of no co-integration can be rejected, implying that there is a long run co-integration relationship among the variables. Upon running regressions with LF, PI and FDI as dependent variables, the paper gets the F-statistics of 2.2434; 1.8665 and 1.5376 respectively; all are smaller than the lower bound critical value of 2.72. In these cases null hypotheses cannot be rejected.

Table 2. **Unit root test results,** *authors'*

At level		At first difference	
Variables	*t*-Statistics	Variables	*t*-Statistics
$L\overline{Y}$	-0.11	$\Delta L\overline{Y}$	-4.79***
LLF	0.26	ΔLLF	-4.28***
LPI	-0.27	ΔLPI	-4.42***
LFDI	-2.15	$\Delta LFDI$	-5.59***

Note: *** denotes the statistical significance at 1%.

Table 3. **ARDL bounds tests,** *authors'*

Dependent Variable	Selected ARDL models	F-statistics	Outcomes
$F_{\overline{Y}}(L\overline{Y} \mid LLF, LPI, LFDI)$	(1,0,0,1)	10.0707	Co-integration
$F_{LF}(LLF \mid LY, LPI, LFDI)$	(1,0,0,1)	2.2434	No co-integration
$F_{PI}(LPI \mid LLF, LY, LFDI)$	(1,1,0,0)	1.8665	No co-integration
$F_{FDI}(LFDI \mid LLF, LPI, LY)$	(1,1,1,0)	1.5376	No co-integration

Next, the paper tests the fitness of model. The results were reported in Table 4. Because all the testing values are higher than the 0.05 critical values, we conclude that the model passes all of the reported diagnostic tests. Once a long run co-integration relationship is established, the paper runs regression by ARDL (1,0,0,1) specification. The results obtained by normalizing on real GDP per capita in both short run and long run are also reported in Table 4.

In the short run, these parameters are both positive as expected. However, only PI variable has statistical significance at 1%. It means that, theoretically, both factor affect the growth of economy, however, within this empirical research, only public investment is found to have impact on real GDP per capita. For the case of FDI variable, it could be explained that foreign enterprises need more time to set up a plant or a factory before starting to produce goods and services.

In the long run, labour force has positive impact on real GDP per capita but only significant at 15% t-probability. PI variable does display positive influence on dependent variable at the significance level of 1%. In particular, 1% increase in public investment leads to 0.09% increase in real GDP per capita; much higher than that of FDI (0.01%). This robust evidence shows that public investment has a critical role in enhancing real income of people.

The equilibrium correction coefficient, estimated (-0.86) is highly significance at 1% level. It has the correct sign and implies a rather high speed of adjustment to equilibrium after a shock. Approximately 86% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

Table 4. **Regression results,** *authors'*

ARDL(1,0,0,1) selected on AIC. Dependent variable is $\Delta L\bar{Y}$				
Panel A: Short-Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔLLF	0.071782	0.054965	1.305945	0.2072
ΔLPI	0.079766	0.023321	3.420390	0.0029
ΔLFDI	0.002952	0.003314	0.890954	0.3841
CointEq(-1)	-0.856143	0.161554	-5.299407	0.0000
Ecm = $L\bar{Y}$ – (0.084 LLF + 0.093 LPI + 0.012 LFDI + 5.252*C)				
Panel B: Long-Run Coefficients				
LLF	0.083843	0.056192	1.492082	0.1521
LPI	0.093169	0.031658	2.942955	0.0084
LFDI	0.012444	0.004971	2.503177	0.0216
C	5.251985	0.500662	10.490078	0.0000
R-squared	0.942497	Durbin-Watson stat.		1.849411
R-bar-squared	0.927365	Akaike info criterion		-3.454398
F(3,25)	62.28390			
Prob(F-stat)	0.000000			
Panel C: Diagnostic tests				
B-G Lm test statistic		0.22 (0.64)	No autocorrelation	
ARCH test		0.77 (0.40)	No hetereoskadasticity	
Ramsey RESET test		0.79 (0.39)	No functional misspecification	

Note: in ( ) is the p-value.

Variance decomposition can be utilized to examine the relationships among economic variables. For a ten-year period, the variance decomposition results are reported in Table 5. In this case, the dependent variable "Innovations" is largely explained by FDI (54.24%), followed by LF (15.98%); by itself (15.90%) and PI (13.88%). Changes in LF are chiefly explained by its own value (88.14%), followed by $\bar{Y}$ (6.39%); FDI (4.27%) and PI (1.29%). Innovations of PI are mostly explained by LF (75.11%), followed by PI (22.32%); $\bar{Y}$ (2.23%) and FDI (0.34%). And innovations in FDI are mainly explained by its own past value (54.70%), about 21.95% and 21.87% due to PI and LF respectively, followed by $\bar{Y}$, 1.47%.

Table 5. **Variance decomposition percentage of ten-year error variance,** *authors'*

		Typical shock in:			
		$L\bar{Y}$	*LLF*	*LPI*	*LFDI*
Percent of forecast error variance in:	$L\bar{Y}$	15.90	15.98	13.88	54.24
	LLF	6.39	88.14	1.29	4.27
	LPI	2.23	75.11	22.32	0.34
	LFDI	1.47	21.87	21.95	54.70

From these results, several conclusions can be deduced as follows:

1. Innovation of real GDP capita is strongly affected by FDI (54.24%). This reflects the fact that within ten years the role of FDI will become much more impor-

tant in pushing up people's income. This is because, on one hand, the minimum wage in FDI sector tends to be much higher in comparison with public sector; on the other — from foreign enterprise's viewpoint, they are willing to pay higher salaries to attract more skillful labours whose productivity is higher.

2. Changes in PI are essentially explained by PF (75.11%) because Hanoi's municipal government often bases on the increasing of labor force annually to map out public investment policy to resolve emerging social issues such as unemployment. Empirical experiment indicates the bilateral nexus between PI and FDI exists but its significance varies, with 21.95% influence from PI to FDI and only 0.34% in reverse direction. These figures partly suggest the spill-over effect that PI creates to attract more FDI.

3. The influence of real GDP capita on the innovation of FDI is negligible. This result corresponds to the real FDI in Hanoi in the past 25 years. In reality, foreign investors pay much concern to investing in export industries. As if they invest in service sector, their targeted customers are foreigners and rarely Vietnamese high-income people. Therefore, real GDP capita of domestic market is not a major priority from their standpoint.

Conclusion.

1. The main findings:

1.1. In the short run, FDI has no effect on the increase of real gross domestic product per capita in Hanoi. Because administrative procedures are still complicated at the current stage of economic reforms, foreign investors often face some difficulties in capital disbursement. In the long run, the impact of FDI on dependent variable, even positive, is much smaller than that of PI and far from expected.

1.2. The paper discovers the bilateral relationship between FDI and PI but its significance is far from each other. Decisions of foreign investors are rather strongly affected by the scale of public investments. In other words, the flow of public investments does not remarkably improve people's income but partly attracts more foreign direct investments.

1.3. Although still holding the leading role in the economy PI would be losing this position over time. Within a ten-year period, the data shows that mere 13.88% innovation of real GDP capita is explained by PI despite the fact that the size of PI projects is usually much bigger than FDI. It means that its effectiveness is far from meeting the requirement.

2. Policy implications. Public investment projects demonstrate the urgent need for revision because PI's role is not only to create jobs but also to increase workers' income. Therefore, PI actually plays the critical role in speeding up the economy to develop sustainably. This becomes more important when the economy moves from closed to market orientation. It is established that if PI operates effectively, real income per capita would be considerably improved.

FDI played a certain role in improving real gross domestic product per capita in the past 25 years. Foreign enterprises explore clearly their advantages in long run rather than short run. The paper discovers that in the past municipal government has only focused on attracting as much FDI as possible in order to compensate the shortage of investment capital. In other words, they do not pay enough attention to the actual impacts of FDI. This also means they do not concentrate on optimizing FDI

inflows in the long run, for example, the potential spill-over effect. If the economy does not take full advantage of FDI as mentioned above to increase its competitiveness then as the investment environment changes, sooner or later, capital is bound to move out. Hence, in order to increase the positive effects of FDI, there are some critical points to be overcome in the future such as:

Firstly, the municipality needs to change its viewpoint over FDI sources. Gone are the days when it was urgent to attract as much FDI as possible. Instead, in the coming years, the focus should be on directing FDI to those industries with high forward and backward linkages, not overwhelmingly to the service sector as today. Foreign projects are welcomed as they are bringing over new technology and/or top-skilled labor and/or environment-friendly products. Moreover, foreign enterprises have to be committed to cooperate with domestic firms in order to bring into full play both vertical and horizontal integrations.

Secondly, it is necessary to amend the concerned institutions on the direction of providing more investment priorities for differently target groups. Hanoi authority needs to build a system of dynamic priorities over each targeted foreign investor. For instance, if foreign investors manage to meet the expected objectives completely then they could enjoy additional priorities.

3. Prospects for further research. Because this paper is the first attempt to quantify the impact of FDI on $\overline{Y}$, so it only includes the selected key variables into the model. In further studies, other authors might add more independent variables such as education level, trade openness or dummy one to distinguish male and female shares in the labour force. As manifested in the paper, it focuses more on the impact of FDI on the dependent variable, thus, the nexus between FDI and PI does not take into account meticulously. Theoretically, $\overline{Y}$ is one of the determinants to attract more FDI inflow, especially for industries that serve predominantly domestic customers. Therefore, it leaves the room for further studies.

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